

6820 Dual-Fuel™ and 4820 Hot Air Gas Burners are used on steel reheat furnaces, glass melters, non-ferrous melters, rotary calciners, and other applications where low velocity luminous flames are desired.

They use combustion air at temperatures up to 1200 F. They burn gases of 500 Btu/scf or higher and light or heavy fuel oils.

GAS OPERATION

6820 and 4820 Burners provide soft luminous flames when burning natural or coke oven gas in large open furnaces, such as slab or billet heaters. Flame shapes depend on forward velocity of the burning gases. Although rated nominally at 4.5"wc (1000°F) air, flames tend to develop full length at combustion air pressures of 2-3"wc at the burner.

Gas flames are stable when starting with ambient temperature combustion air in cold, tight chambers; but well defined flame shapes may not develop until air is over 450 F.

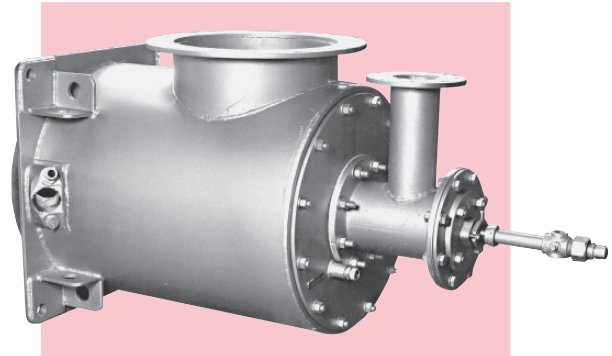
For stoichiometric firing, required natural gas pressure at the burner varies from approximately 60% of main air pressure with 60 F air to approximately 25% of air pressure with 1000 F air.

Retract the oil atomizer during gas operation with 6820 Burners.

OIL OPERATION

Standard 6820 Burners use high pressure "tip emulsion" atomizers (Series 5643) with 70 to 90 psi steam or compressed air. Resultant clean, highly luminous, well-defined flames are slightly longer than natural gas flames. Heavy oils (#4 through #6) must be heated to reduce viscosity to 100 SSU or less at the burner.

A reliable low pressure atomizer (Series 5654), using 24-32 psi cold air supplied by a turbo blower, is available for most grades of oil when steam or compressed air is unavailable.



CONTROL SYSTEMS

6820 and 4820 Burners operate from 0.2"wc main air pressure to 10"wc or higher. High fire air rate usually is between 2"wc and 6"wc. Input and air/fuel ratio controls should be selected and engineered for the rangeability required.

If combustion air temperatures vary considerably during normal operating cycles, metered flow control with air temperature compensation is recommended, e.g., North American's 8196 or 8199 Combustion Controllers.

When combustion air can be metered on the cold side of the recuperator, it may be acceptable to use differential pressure balanced ratio regulator (e.g., North American 7266 units). However, recuperator leakage can cause significant distortions and variations in air/fuel ratio when "cold side metering" is used.

North American field engineers are qualified to recommend the system most suitable for each application.

IGNITION AND FLAME SUPERVISION

A 4014 Pilot assembly is normally used to light the burner. Ignition sequence should provide for low fire start between 0.2 and 1.0"wc main air pressure. Pilot mixture pressure should be 3"wc or more.

The Honeywell C7035A UV detector (with 8837-G Adapter) has been tested on 6820 Burners. Consult North American about other detectors.

TABLE I 4820 Gas Only and 6820 CAPACITIES--with 5643 Atomizer

(See Table II for 5654 Atomizer capacities.)

Burner size	Main Air 1000 F Air at 4.5"wc ΔP	Oil, gal/hr Based on 1400 ft ³ air for each gallon oil	Atomizer designation	Steam at 80 psi			Atom. Air at 80 psi		Flame lengths, ft [Ⓢ]	
				(Oil Flowing) lb/hr	(No Oil) lb/gal oil	(No Oil) lb/hr	(Oil Flowing) scfm	(No Oil) scfm	Gas	#2 Oil
-8	19 000 scfh	14 gal/hr	5643-01	23	1.64	40	7.7	13.3	8	9
-9	32 200	23	5643-01	19	0.83	40	6.3	13.3	10	11
-10-A	40 000	29	5643-01	17	0.59	40	5.7	13.3	11	12
-10-B	53 000	38	5643-01	15	0.39	40	5.0	13.3	12	13
-12	78 000	56	5643-0	80	1.43	140	26.7	46.7	13	14
-14	106 000	76	5643-0	76	1.00	140	25.3	46.7	14	16
-16	134 000	96	5643-0	65	0.68	140	21.7	46.7	15	17
-18	172 000	123	5643-1	180	1.46	225	60.0	75.0	17	19
-20	215 000	154	5643-1	160	1.04	225	53.3	75.0	19	20
-22	260 000	186	5643-1	150	0.81	225	50.0	75.0	21	22
-24	310 000	221	5643-3	550	2.49	660	183	220	24	25

Ⓢ Estimated based on limited laboratory testing.

CONSTRUCTION

Burner bodies are fabricated of heavy gauge carbon steel and lined internally with a castable refractory selected for the optimum combination of insulating value and erosion resistance. Internal parts are heat-resistant alloy and the stabilizing disc is faced with high alumina refractory.

All burners are provided with ports for gas pilot and UV flame detector sensor, plus an observation port adjacent to the pilot port and another in the burner backplate.

Burners are assembled according to an arrangement code (specified on order) that indicates location of pilot, flame sensor gas connection, and (if applicable) atomizing air connection, in relation to main air connection. (See Sheet OES-6000.)

INSTALLATION

6820 Burners should be mounted on an adequately braced and rigid furnace shell. Burner tunnels or tiles should be formed per Dimensions 6820 using good quality plastic or castable refractories suitable for temperatures at least 300 F higher than maximum furnace temperature.

North American Supplement DF-M1 describes procedures for forming burner tiles and illustrates a properly installed tile in Figure 5.

Where appropriate, North American can furnish a self-supporting tile and mounting plate assembly.

OPTIONS

Gas Tee: The threaded gas inlet flange on 4820 Burners can be replaced with a flanged gas tee.

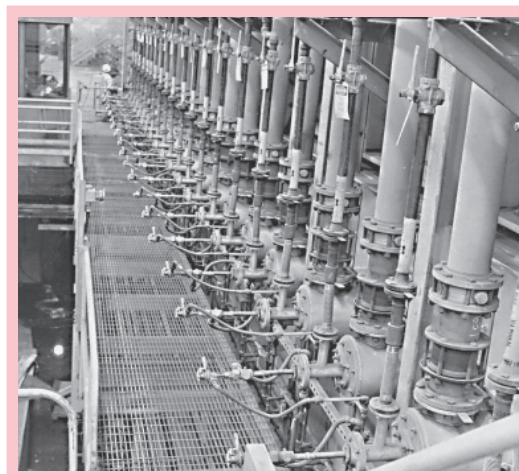
Angled Mounting Plates--For ease in furnace shell construction.

Additional Pilot and Flame Sensor Locations--When burners are to be used in "left" or "right" positions in a pair.

Mandrel--Heavy gauge steel for forming burner ports.

Mounting Plate and Tile Assembly--When a site constructed tile is not appropriate.

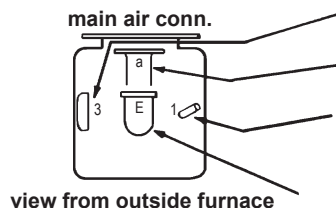
5642 Atomizer--An alternate high pressure (steam or compressed air) "full emulsion" atomizer is available in some sizes.



6820-8 Burners on soak zone of a steel reheat furnace. ►

Arrangement Designators are specified relative to the main air connection at 12 o'clock and should be listed for **pilot, gas, flame supervision and atomizing air in that order**. Good practice dictates that neither the pilot nor the flame supervision device be on the bottom of the burner.

Atomizer connections need not be specified because they can be rotated in the field.



pilot position designators are



gas connection position designators are



flame supervision designators are (must be 90, 135 or 180° from pilot)



atomizing air connection position designators are specify for 6820- -54)



TABLE II

6820 CAPACITIES—with 5654 Atomizer

Air Burner Size	Main Air, scfh 1000 F Air at 4.5"wc ΔP	Oil, gal/hr		scfh Atomizing	
		Based on 1400 ft ³ air for each gallon oil	Atomizer Designation	at 16 osi (Not Burning)	
-8	19 000 scfh	14 gal/hr	5654-3	3 000 scfh	
-9	32 200	23	5654-3	3 000	
-10-A	40 000	29	5654-4	4 030	
-10-B	53 000	38	5654-4	4 030	
-12	78 000	56	5654-5	6 500	
-14	106 000	76	5654-6	11 300	
-16	134 000	96	5654-6	11 300	
-18	172 000	123	5654-7	18 400	
-20	215 000	154	5654-7	18 400	
-22	260 000	186	5654-7	18 400	

To order, specify: 6820-(code)-(A or B if applicable) (43 or 54 or 42 atomizer) Burner complete (specify Arrangement Designator--see sketch). Specify type of gas if not natural.

Examples: 6820-10-A43 Burner complete with arrangement 3a1
6820-10-B54 Burner complete with arrangement 3a1F

WARNING: Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Parts of this product may exceed 160F in operation and present a contact hazard. Fives North American urges compliance with National Safety Standards and insurance Underwriters recommendations, and care in operation.

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